



ABSTRACT

Waveguide grating devices. One includes at least one waveguide having an end, the end having an endface; and a waveguide grating fabricated on the endface, the waveguide grating having at least one waveguide layer and at least one grating layer.

- 5 The waveguide layer is a separate waveguide from the waveguide on which the waveguide grating is fabricated. Systems for spectral filtering. One, which utilizes a guided-mode resonance effect in a waveguide, includes at least one waveguide having a proximal end and a distal end having an endface; and a waveguide grating fabricated on the end of the waveguide and having a plurality of variable parameters such as
- 10 permittivity of the grating layer(s) and permittivity of the waveguide layer(s). Methods of forming waveguide grating devices, and methods of detecting one or more parameters of a medium using a waveguide grating device are also disclosed. A waveguide grating device that utilizes the guided mode resonance effect in a waveguide having an endface on which a waveguide grating is fabricated. The waveguide grating has a waveguide
- 15 layer, which is waveguide separate from the waveguide on which the waveguide grating is fabricated, and a grating layer. Also disclosed is a system for spectral filtering. The system utilizes a guided mode resonance effect in a waveguide, and includes a waveguide grating device. The waveguide grating fabricated on the end of the waveguide grating device has a plurality of variable parameters such as permittivity of
- 20 the grating layer(s) and permittivity of the waveguide layer(s). For the disclosed waveguide gratings, the waveguide layer and the grating layer may be the same layer. The system also includes a source coupled to the proximal end of the waveguide for propagating a signal therethrough. Methods for forming the disclosed waveguide grating devices are included. Such methods include providing waveguides having ends with
- 25 endfaces, and fabricating waveguide gratings on the endfaces to form the waveguide grating devices. Methods of detecting one or more parameters of a medium are also disclosed. The methods include providing a waveguide grating device, contacting the waveguide grating with a medium, propagating a signal having at least one signal attribute through the waveguide, and comparing the modified signal attribute to a known
- 30 signal attribute to detect a parameter of the medium.